CONFERENCE ON DISARMAMENT

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LETTER DATED 24 AUGUST 1992 FROM THE REPRESENTATIVE OF NORWAY ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT, TRANSMITTING A REPORT ENTITLED "TRANSPORT OF SAMPLES CONTAINING CHEMICAL WARFARE AGENTS BY AIR"

I would appreciate your kind cooperation in having the enclosed report, entitled "Transport of samples containing chemical warfare agents by air" circulated as both a document of the Conference on Disarmament and a Working Paper of the Ad Hoc Committee on Chemical Weapons.

This research report is a contribution by Norway in a series that was started in 1982 on sampling and the handling of samples related to a Chemical Weapons Convention.

(Signed) Jostein H. Bernhardsen
Minister Counsellor
Permanent Mission of Norway

GE.92-62741

TRANSPORT OF SAMPLES CONTAINING CHEMICAL WARFARE AGENTS BY AIR

Introduction

In connection with verification of a Chemical Weapons Convention, it is important to have methods for safe and rapid transport to the Technical Secretariat and/or designated laboratories of samples collected during an inspection. Since many of the schedule 1 compounds are unstable, the transport time should be kept at a minimum, thus arguing for transport by air. Problems with getting permission to transport samples containing chemical warfare agents by commercial airline companies have, however, been addressed on several occasions during the International Comparison (Round-Robin) Tests (CD/CW/WP.350 July 1991 and CD/1155 June 1992). The Norwegian Defence Research Establishment has therefore examined the International Civil Aviation Organization (ICAO) / International Air Transport Association (IATA) regulations for transport of dangerous goods by air. A method for packing, labelling and transport of samples containing relatively low concentrations of chemical warfare agents has been worked out. This method has been tested by transport of samples containing chemical warfare agent simulants and has been accepted by airline companies.

Classification of chemical warfare agents

Chemical warfare agents should be classified as dangerous goods, class 6, division 1, i.e. poisonous (toxic) substances. Since none of the schedule 1 compounds are mentioned by name in the regulations, the generic shipping names: poisonous liquids n.o.s. (not otherwise specified) or poisonous solids n.o.s. should be used. These groups have UN numbers 2810 and 2811 respectively. The packing instructions for such samples depend on the amounts and toxicity of the poisonous compound contained in it. The packing group could be determined by using Table 1 or 2.

Packing Group	Oral toxicity LD_{50} (mg/kg)	Dermal toxicity LD_{50} (mg/kg)
I	≤5	≤40
II	>5 ≤50	>40 ≤200
III	(s) >50 ≤200 (l) >50 ≤500	>200 ≤1000

Table 1 Criteria for routes of administration other than inhalation

(s): solids (l): liquids

Packing Group	Inhalation toxicity by dust and mist LC_{50} (mg/l)	Inhalation toxicity by vapours
I	≤0.5	$V \geq 10 * LC_{50}$ and LC_{50} ≤1000 ml/m³
II	>0.5 ≤2	$V \geq LC_{50}$ and $LC_{50} \leq$ 3000 ml/m³
III	>2 ≤10	$V \geq 0.2 * LC_{50}$ and LC_{50} ≤5000 ml/m³

Table 2 Criteria for inhalation of vapours, dust and mist

V: Vapour concentration in air (ml/m³) at 20°C and standard atmospheric pressure

In most cases, the composition and toxicity of the samples are not known prior to transport. The samples should then be placed in the most restrictive group (i.e. Packing Group I). Some special provisions should, however, be followed by transporting poisonous solids or liquids:

Liquids having a vapour inhalation toxicity of Packing Group I are forbidden on both passenger and cargo aircraft. Liquids having a mist inhalation toxicity of Packing Group I are forbidden on passenger aircraft. They may be carried on cargo aircraft providing they are packed in accordance with the packing instruction for the Packing Group I substance and the maximum net quantity per package does not exceed 5 l.

Solids having an inhalation toxicity of Packing Group I are forbidden on passenger aircraft. They may be carried on cargo aircraft providing they are packed in accordance with the packing instruction for the Packing Group I substance and the maximum net quantity per package does not exceed 15 kg.

These special provisions would normally not cause problems, since the vapour or mist concentrations of small amounts of schedule 1 compounds diluted in a sample matrix are very low.

Packing and labelling

The general packing requirements given in the regulations (e.g. the need for absorbing material surrounding the inner packagings) should be followed when transporting all sorts of dangerous goods. In addition, the packing instructions given in Table 3 below should be used for chemical warfare agents. These packing instructions are shown in detail in Annex 1 to this paper.

	Passenger aircraft		Cargo aircraft	
	Packing instruction	Max net quant. pr pk.	Packing instruction	Max. net quant. pr pk.
Poisonous solids n.o.s.	606	5 kg	607	50 kg
Poisonous liquids n.o.s.	603	1 l	604	30 l

Table 3 Packing instructions for chemical warfare agents

A Shipper's Declaration for Dangerous Goods should be completed as shown in annex 2.

The outer packagings should be type approved for transport of dangerous goods (i.e. have proper UN-marking) and labelled with the following informations:

1. Class no., Shipping name, Technical name and UN-number

e.g. Class 6.1
Poisonous liquids n.o.s
Water samples containing chemical warfare agents
UN 2810

2. Shipper's name and address

3. Class hazard label: Black skull and crossbones on white background. Class and division numbers (i.e. 6.1) should be written in the lower corner of the label.

4. Package orientation (two arrows indicating the top of the package)

5. UN -marking

e.g.

(U N) 4D/X60-Y75-Z100
S/91/S/SP-326

where 4D is the type of outer packaging (plywood box),
X60-Y75-Z100 is the maximum relative density of liquids or the maximum weight of solids the type has been tested for in Packing groups I, II and III respectively,
S means that the type is intended to contain solids or inner packagings,
91 is the two last digits of the production year of the packaging,
S is the State authorizing the allocation of the mark (Sweden) and
SP-326 is the name of the manufacturer or other identification of the packaging specified by the appropriate national authority.

Transport exercise

The packing and labelling procedures have been tested by trial transports of packages containing some environmental samples (water, soil, sand and pieces of rubber and protective clothing) containing the harmless chemical warfare agent simulant dipropyleneglycol monomethylether (DPM). The shipping names "poisonous solids n.o.s." and "poisonous liquids n.o.s" and the technical names "environmental samples containing chemical warfare agents" and "water containing chemical warfare agents" were used (see annex 2). The packages have been sent from Oslo to North Norway, to Prins Maurits Laboratory TNO in The Netherlands and to Civil Defence Analytical Chemical Laboratory in Denmark and back. Different cargo handling and airline companies and both passenger and cargo aircrafts have been used for the transport.

The samples were placed in 50 ml glass bottles with air-tight screw caps and the bottles packed in polyurethane foam with activated charcoal. The samples were then placed in a plywood box (40 cm x 30 cm x 27 cm) surrounded by foam rubber. The maximum net quantities per inner packages (glass bottles) given in annex 1 and outer package (plywood box) given above were observed. The plywood box was labelled according to the regulations described above.

Conclusions

The procedures for packing and labelling of samples containing traces of chemical warfare agents have been accepted by all but one airline company. This company did not accept the technical name: "environmental samples containing chemical warfare agents", but accepted the more specific name: "2,2-dichlorodiethylsulfide in sand and rubber". If, therefore, on-site analysis of the samples gives indications of a schedule 1 compound present, this could be included in the technical name.

One general observation is that the airline companies have the responsibility for safety on board, and therefore make the final decision on taking the samples with them or not, even if the packing and labelling are in accordance with the regulations. It is also important

that the outer packagings are type approved for transport of dangerous goods in packing group I.

Even if the transport exercise showed some minor problems, the procedures for packing and labelling described here have been used successfully for transport of samples containing traces of chemical warfare agent simulants. To gain more experience, more trial transports should, however, be carried out. The procedures are unsuitable for the transport of concentrated samples of schedule 1 compounds from production, destruction or storage facilities. The problem encountered with transportation of such samples has to be dealt with by changing the ICAO/IATA regulations. Such changes should also take into account the need for exchange of analytical reference substances between the Technical Secretariat and designated laboratories.

ANNEX 1: PACKING INSTRUCTIONS

Packing instruction 603

Single packagings are not permitted.

Combination packagings:		Code	Max. quantity for inner package
Inner package:	* Glass or earthenware	- IP.1	0.5 l
	* Plastic	- IP.2	0.5 l
	* Metal	- IP.3, IP.3A	1.0 l
	* Glass ampoule	- IP.8	0.5 l
Outer package:	* Steel drum	- 1A2	
	* Aluminium drum	- 1B2	
	* Steel jerrican	- 3A2	
	* Plywood drum	- 1D	
	* Fibre drum	- 1G	
	* Plastic drum	- 1H2	
	* Plastic jerrican	- 3H2	
	* Wooden box	- 4C1, 4C2	
	* Plywood box	- 4D	
	* Reconstituted wood box	- 4F	
	* Fibreboard box	- 4G	

Packing instruction 604

		Code
Single packagings:	* Steel drum	- 1A1
	* Aluminium drum	- 1B1
	* Steel jerrican	- 3A1
	* Composites (plastic)	- all
	* Cylinders	- p. 3-8-2 (1)

Combination packagings:		Code	Max. quantity for inner package
Inner package:	* Glass or earthenware	- IP.1	1.0 l
	* Plastic	- IP.2	1.0 l
	* Metal	- IP.3, IP.3A	2.5 l
	* Glass ampoule	- IP.8	0.5 l

		Code
Outer package:	* Steel drum	- 1A2
	* Aluminium drum	- 1B2
	* Steel jerrican	- 3A2
	* Plywood drum	- 1D
	* Fibre drum	- 1G
	* Plastic drum	- 1H2
	* Plastic jerrican	- 3H2
	* Wooden box	- 4C1, 4C2
	* Plywood box	- 4D
	* Reconstituted wood box	- 4F
	* Fibreboard box	- 4G

Packing instruction 606

Single packagings are not permitted.

Combination packagings:		Code	Max. quantity for inner package
Inner package:	* Glass or earthenware	- IP.1	0.5 kg
	* Plastic	- IP.2	1.0 kg
	* Metal	- IP.3, IP.3A	1.0 kg
	* Plastic bag	- IP.5	0.5 kg
	* Fibre	- IP.6	0.5 kg
	* Glass ampoule	- IP.8	0.5 kg
	* Paper, plastic/Aluminum	- IP.10	0.5 kg
Outer package:	* Steel drum	- 1A2	
	* Aluminium drum	- 1B2	
	* Steel jerrican	- 3A2	
	* Plywood drum	- 1D	
	* Fibre drum	- 1G	
	* Plastic drum	- 1H2	
	* Plastic jerrican	- 3H2	
	* Wooden box	- 4C1, 4C2	
	* Plywood box	- 4D	
	* Reconstituted wood box	- 4F	
	* Fibreboard box	- 4G	

Packing instruction 607

		Code	
Single packagings:	* Steel drum	- 1A1, 1A2	
	* Aluminium drum	- 1B1, 1B2	
	* Steel jerrican	- 3A1, 3A2	
	* Plywood drum	- 1D, with inner plastic liner	
	* Fibre drum	- 1G, with inner plastic liner	
	* Plastic drum	- 1H1, 1H2	
	* Plastic jerrican	- 3H1, 3H2	
	* Composites (plastic)	- all	
Combination packagings:		Code	Max. quantity for inner package
Inner package:	* Glass or earthenware	- IP.1	1.0 kg
	* Plastic	- IP.2	2.5 kg
	* Metal	- IP.3, IP.3A	2.5 kg
	* Plastic bag	- IP.5	1.0 kg
	* Fibre	- IP.6	1.0 kg
	* Glass ampoule	- IP.8	0.5 kg
	* Paper, Plastic/Aluminum	- IP.10	1.0 kg
Outer package:	* Steel drum	- 1A2	
	* Aluminium drum	- 1B2	
	* Steel jerrican	- 3A2	
	* Plywood drum	- 1D	
	* Fibre drum	- 1G	
	* Plastic drum	- 1H2	
	* Plastic jerrican	- 3H2	
	* Wooden box	- 4C1, 4C2	
	* Plywood box	- 4D	
	* Reconstituted wood box	- 4F	
	* Fibreboard box	- 4G	

The codes used in the packing instructions, are codes for designation of types of packagings.

ANNEX 2: SHIPPER'S DECLARATION

Shipper

NORWEGIAN DEFENCE RESEARCH
Establishment
P.O. Box 25,

N-2007 KJELLER, NORWAY

Air Waybill No.

Page of Pages

Shipper's Reference Number

Consignee

ANDØYA AIRPORT
Andenes

Norway

Two completed and signed copies of this Declaration must be handed to the operator

TRANSPORT DETAILS

This shipment is within the limitations prescribed for (delete non-applicable)

PASSENGER AND CARGO AIRCRAFT

~~CARGO AIRCRAFT ONLY~~

Airport of Departure: Oslo, Fornebu

Airport of Destination: ANDENES

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

Shipment type (delete non-applicable)

NON-RADIOACTIVE ~~RADIOACTIVE~~

NATURE AND QUANTITY OF DANGEROUS GOODS (see sub-Section 8.1 of IATA Dangerous Goods Regulations)

Dangerous Goods Identification				Quantity and type of packing	Packing Inst.	Authorization
Proper Shipping Name	Class or Division	UN or ID No	Subsidiary risk			
Poisonous solids n.o.s. (Environmental samples containing chemical warfare agents)	6.1	UN2811		1 Plywood box x 2 kg	606 I	
Poisonous liquids n.o.s. (Water containg chemical warfare agents)	6.1	UN2810		1 Plywood box x 1 l	603 I	

Additional Handling Information

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labelled, and are in all respects in the proper condition for transport by air according to the applicable International and National Government Regulations.

Name/Title of Signatory

Place and Date

Signature (see warning above)